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THE AGRICULTURAL HISTORY SOCIETY

THE AGRICULTURAL HISTORY SOCIETY was organized in 1919 to promote interest, study, and research in the history of agriculture. It holds an annual meeting in Washington, D. C., in the spring or early summer. Through an affiliation agreement, it has its principal literary session in connection with the annual meeting of the American Historical Association. At present the society has three hundred members.

Three volumes of *Agricultural History Society Papers* have been published in coöperation with the American Historical Association as part of its annual reports. These volumes have been distributed separately by the society.

In 1927 the Agricultural History Society began the publication of *Agricultural History*, a quarterly journal which is being developed as a medium for the publication of research and documents pertaining to the history of agriculture and as a clearing house for information of interest and value to workers in the field. The term, agricultural history, is interpreted broadly. Materials on the history of agriculture not only in the United States but in all countries and in all periods of history are included, and also materials on institutions, organizations, and sciences which have been factors in agriculture. Two issues were published in 1927. *Agricultural History* was issued quarterly in 1928.

At the present time the outstanding need of the society is funds with which to increase the size of its journal. Members of the society can help materially by remitting dues which are unpaid and making active efforts to secure new members.

Members can also help fulfill the purposes of the society by reporting news of research and other activities relating to agricultural history, the location of important documents and papers pertaining to the field, and making suggestions of ways of extending the influence and the scope of the work of the society.

Correspondence concerning membership, contributions, manuscripts, and books for review should be sent to the editor.

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AGRICULTURAL HISTORY

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THE CATTLEMAN IN THE AGRICULTURAL HISTORY OF THE NORTHWEST

BY ERNEST S. OSGOOD*

From the day that Dr. Turner invited students of American history to stand with him at Cumberland Gap and watch the procession of civilization struggle through that defile, the picture of successive frontiers has been a commonplace in the study of the westward movement. A whole generation of students have discovered numerous strategic points of historical vantage from which to view the march past of, "the buffalo following the trail to the salt springs, the Indian, the fur-trader and hunter, the cattle raiser and the pioneer farmer."[1] With a sort of triumphant inevitability, the last of these figures marches forward, for he is permanent while the others are temporary and it is he who will be in possession after the others have passed on.

In the passing of what has been generally called our last frontier, namely, that of the range cattleman of the High Plains, this normal and orderly process is not so clear. In many sections of the High Plains, particularly in the northern end, it was not the pioneer farmer who swept aside the cattleman, nor was it

* Mr. Osgood is assistant professor of American history at the University of Minnesota. He received his A.B. degree from Dartmouth College in 1912 and his Ph.D. degree from the University of Wisconsin in 1927, his dissertation being entitled The Northern Cattle Country, 1865–1890. He has spent more than a decade in Montana and Wyoming where he has gathered much unused historical material and become familiar with the setting of the story of the cattle range industry. His findings have just been published by the University of Minnesota Press in a book, *The Day of the Cattleman*. The paper here printed was read by Mr. Osgood at the joint meeting of the Agricultural History Society with the American Historical Association at Indianapolis on December 29, 1928.

[1] F. J. Turner, *The Frontier in American History* (New York, 1921), p. 12.

the pioneer farmer who succeeded to the cattleman's domain after the last range herd had vanished. It is the purpose of this paper to inquire briefly into some of the forces which actually did take the cattleman out of the picture on such a typical range as Wyoming and to describe, if possible, what the picture looked like after his withdrawal.

The chief feature of the range cattle business was, of course, the free pasturage upon the unused and unoccupied acres of the public domain. This enormous natural resource, open to all, was at once, the source of the cattleman's prosperity and strength and the cause of his ruin and weakness. The combination of cheap stock and free grass caused the northern rangeman's sudden entrance into the prosperity of the eighties;—the effort to expand the business far beyond the carrying capacity of the ranges, the speculation and booming which the earlier profits engendered caused his ruin. Most of the problems confronting the industry, and they were many, the range cattleman would have solved, the danger to his property from the cattle thief, the marauding Indian and disease. The elaborate machinery of the round-up and inspection testify to his ingenuity in meeting the problems of ownership and sale. But the one problem which he did not and could not solve was the control of the range and the prevention of overcrowding.[2]

In his attempts to solve this problem, the cattleman became land conscious. As a result the industry began to move over from a cattle to a land and cattle basis. It was here that the stress came and not through the outside pressure of an advancing farming frontier.

In the early days of the range, the custom of priority was enough to meet the situation, for there was room enough for all. The early laws of the states and territories provided punishment for those who drove stock off an accustomed range and

[2] "The business was a fascinating one and profitable so long as the rangers were not over-stocked. The cattleman found ways to control the other difficulties but the ranges were free to all and no man could say, with authority, when a range was over-stocked." Granville Stuart, *Forty Years on the Frontier* (Cleveland 1925), II, p. 185.

although these were directed primarily against stealing, incidentally they recognized the fact that by grazing a certain area, the stock grower was in the way of gaining a kind of prescriptive right to the same as over against any newcomer.[3]

This idea that a certain area might become the accustomed range to be held against all comers on the basis of priority right is reflected over and over again in the claim advertisements in newspapers published in the newly opened areas. When eastern Montana and central Wyoming were cleared of Indians following the last Sioux war, cattlemen arriving in these regions set up such claims in a manner not unlike that of the miners in the mountains. The newspapers of Miles City and Glendive carried long columns of such claims.[4]

Such a claim was, of course, unenforceable in any court of law. In order to make it good, the claimant must either get control of the water adjacent to his range or unite with his neighbors in the same district in refusing to cooperate with any newcomer.

The first of these alternatives depended upon the physical environment. It was an axiom of the "cow country" that water controlled the range and the claimant might, by a careful selection achieve such control.[5] But the presence of others along a stream too long to permit of individual control, meant that the exclusion of outsiders must come through some sort of an understanding among those already on the ground. Such cooperation among neighbors in the conduct of the range business resulted in a certain amount of range privilege and good will. Participation in the round-up, in the use of the common corrals, in the group

[3] *Laws* of Texas, 1866, 11th Sess., pp. 187–188; *Laws* of Wyoming Territory, 1873, 3rd Sess., p. 225; *Laws* of Montana Territory, 1872, 7th Sess., p. 287.

[4] *Glendive* (Montana) *Times*, April 12, 1884 contains several columns of such claim notices.

[5] A Colorado cattleman testifying before the Public Land Commission of 1879, stated the case as follows. "Wherever there is water, there is a ranch. On my own ranch (320 acres) I have two miles of running water; that accounts for my ranch, being where it is. The next water from me in one direction is twenty-three miles; now no man can have a ranch between these two places. I have control of the grass, the same as though I owned it. . . . . Water accounts for nine-tenths of the population in the West on ranches." *Ho. Ex. Doc.* 46, 46th Cong. 2nd Sess., "Preliminary Report of the Public Land Commission 1879." P. 297.

protection against Indians, thieves, fires, and predatory animals, and, in some cases, in the group drive of the beef turn-off to the railroad could be permitted or denied to the newcomer. To deny such privileges, often appeared to be the only way of preventing the overcrowding of the range. The success of such a method, would, of course, depend upon the size of the outfit so denied and upon the amount of cooperation among the older stockgrowers.

In Wyoming where the powerful Wyoming Stock Growers' Association achieved an efficiency in organizing the range business beyond that of any group upon the High Plains, newcomers were sometimes prevented from crowding in on already occupied ranges. By the law of 1884, the Association was given complete control of the stock-growing industry of the Territory.[6] True, all stock-growers were eligible for membership in the Association, but the Association was judge of its own membership and a newcomer was not likely to crowd a range when it might result in his being denied the obvious advantages of membership.[7] Rather than have this occur, he was likely to seek a less crowded range, if such existed. The Association, however, had no control over the expansion of the herds of its own members who during the boom period of the eighties over-bought and endangered the safety of all.

Thus where organization failed to prevent crowding, the cattleman was forced to fall back on his own efforts. To those actually in the business, it was perfectly clear by 1884 that continued prosperity depended upon the acquisition of as much land as possible. They no longer thought of themselves as temporary occupants, permitted to utilize these acres until the farmer arrived, but as natural, permanent and all important. "Considered as between the farmer and the stockman," wrote the Secretary of the Wyoming Association in 1884, "the stockman

[6] *Laws* of Wyoming Territory, 1884, 8th Sess., pp. 148–152.

[7] Under the By-Laws of the Association, the applicant for admission must have his name presented by a member. This application was reported on by an investigating committee. It was then voted on and three adverse votes were sufficient to reject. *By Laws of the Wyoming Stock Grower's Association*, p. 7.

had on his side, the following arguments which it would be hard to refute. We occupy a country in which irrigation is a conceded necessity to agriculture. Nine-tenths of the surface is totally unfit for the plow even under the most favorable conditions of capital. The stockmen utilize it all. Displace him and his capital and fifty years must pass before these plains can be made to produce the same taxable wealth in any other form."[8] Forty-one years later, 1925, the accuracy of this prophecy is the best support of the cattleman's argument. Of the sixty-two and a half million acres in the state, about one-third was privately owned. Only 8.8 per cent of this land in private ownership was devoted to agriculture, the remainder was in privately owned pastures. Thus, less than 3 per cent of the total area of the state had become agricultural land in the intervening period.[9]

One thing was certain, land laws made to fit the needs of the middle-western agricultural advance had broken down completely west of the hundredth meridian. Cattlemen, seeking a permanent basis for their industry, were painfully aware of this, as were Major Powell and others whose familiarity with the High Plains gave them a realistic approach to the problem. As for the rest of the country, any effort to remodel our land laws to meet the novel environment was sure to result in an outcry against land monopoly. It made little difference to a people schooled in the tradition of a farm home for everyone to point out that farm homes for poor men on the marginal land of Wyoming was a romantic absurdity. The farmer should be permitted to retain his inalienable right to fail as well as to succeed on a quarter section of free land. The agrarian discontent that was expressing itself in attacks on the railroads, the "grasping corporations" and the "money power" of Wall Street, turned upon the cattle kings along the Laramie and the Powder. The arrival of the Democrats in Washington in 1885 as the party of reform resulted in the overhauling of the Land Office and a general airing of the land abuses that had been permitted under the previous Republican administration.

[8] *Cheyenne* (Wyoming) *Daily Sun*, April 4, 1884.

[9] *Wyoming Agricultural Statistics*, Joint Bulletin of the United States Department of Agriculture (Cheyenne 1925) pp. 4–11.

The iniquity of a barbwire fence strung across the Public Domain as a possible means of range control caused a din far louder than the facts warranted. As a matter of fact, the cattle men were not at all agreed on the wisdom of this practice. They were fully aware that such fencing limited the free movement of their herds to new grazing grounds, prevented even grazing and increased the danger of winter losses because it prevented the drifting of the cattle before the storm.[10] The Act of 1885, declaring such fences illegal, caused no particular resentment in the cow country; indeed, it was welcomed by many large as well as small operators.

Another process of far more importance to the future of the cattle industry of the Northwest was under way. Forage, other than the range grasses, began to be of increasing importance, particularly to those with valuable herds. The early cattleman looked upon the wild hay along the streams as something to be fed off by his cattle together with the less luxuriant growth on the benches beyond. A few tons might be cut by the cowboys for the riding stock and in some favorably located spots, hay ranches had been developed to furnish the motive power in stage coach and freighting days and to supply the army posts. Beyond this, little advantage had been taken of this natural resource. The cattle boom changed all this. There was a mad scramble for ranch properties. Speculation in ranch sites became as hectic as speculation in herds. Large companies began to divert some of their capital from the buying of cattle to the purchase of land. This shift in the capital basis of the industry resulted in a tremendous increase in the disposal of land by the government under the various land laws and the appearance of frauds far more serious than those of illegal fencing.

The lands which the cattlemen were getting hold of were those

[10] In commenting on the fencing craze in Texas in 1883, one editor wrote as follows. "Under the old regime, there was a loose adaptability to the margins of the ranges where now there is a clear cut line which admits of no argument, and an over-stocked range must bleed when the blizzards sit in judgment." *Mobeetie* (Texas) *Panhandle* quoted in the *Breeders' Gazette*, IV, No. 16, p. 526, October 18, 1883.

along the streams, where there were natural hay lands or where there was a possibility of hay crops with a minimum of irrigation. The more valuable the herd, the greater the pressure on its owners to secure such lands. The homestead, pre-emption and the desert land laws were used to obtain these stream sites. In the operation of the latter law, fraud appeared earliest and was the most flagrant. As early as 1880 the Commissioner of the General Land Office had been compelled to issue a circular, cautioning the local officers that land upon which wild hay grew could not be regarded as desert land.[11] But as no classification had been made, the discretion lay with the local office and the frauds under that ill-advised and impossible act continued.

In his efforts to find a practical basis for his changing industry, the cattleman turned to the purchase of railroad land. The transcontinental roads were among the first to become aware of the importance of the cattle industry of the High Plains; its capacity for expansion and its relation to the land. In 1875 the government directors of the Union Pacific were urging that the lands, "belonging to the government and to the company ought to be placed under some well devised system of pasturage. . . . whereby the growth of cattle may be fostered and the lands made immediately remunerative."[12]

In 1877 the directors were complaining that none of these lands west of the hundredth meridian were being sold. There would be no inducement for a grazier to purchase from the railroad an alternate section which would be surrounded on all sides by government land. If the government could be induced to lease its land, then the railroad would be able to lease also. By such a joint system, blocks of fifty to five hundred square miles could be leased "at such a rental and for such a term of years and with such restrictions as will best protect the government and the railroad company."[13]

Such a discussion was little better than an academic one in the

[11] *Annual Report* of the General Land Office, 1880, p. 87.

[12] Annual Report of the Government Directors of the Union Pacific Railroad, 1875, *Sen. Ex. Doc.* 69, 49th Cong. 1st Sess., pp. 99–100.

[13] Annual Report, 1877, *op. cit.* pp. 134–135.

seventies, for the cattleman of that period was not interested in schemes whereby he might be allowed to lease land in "blocks of fifty to five hundred square miles." There was plenty of room; he grazed his cattle where he pleased on railroad or government land alike. There was no reason why he should urge the leasing of land which was costing him nothing to use.

Five years later, section lines meant something more to him than markings on the map. The system of alternate railroad section, modelled like the land laws, for middle western farmers, was as awkward for the cattleman seeking private range, as it was for the railroad trying to sell land.

"The present inclination of the cattle interests is toward ownership of the range enclosure by fencing of the same and the better development of stock," the Union Pacific directors reported in 1883, "all of which is, if not rendered impracticable, greatly embarrassed by the existence of alternating government sections."[14] To remedy this, several plans were suggested by Land Commissioner Burnham of the Union Pacific. The first proposal was to exchange all sections of railroad land on one side of the track for all sections of government land on the other, thus making a solid body of land twenty miles wide on one side of the track belonging to the railroad which might be leased or sold to the cattlemen. The second proposal was a modification of the land laws so as to allow for a sale of grazing lands in large tracts, government and railroad sections alike. The third plan was a long time lease of the government sections.[15] Action on any of these proposals was impossible, for it would immediately raise the cry of land monopoly.

The outcome was the purchase of railroad sections for as low as a dollar an acre on very favorable terms and the fencing of outside sections, a process which brought within the fence an equal number of government sections.[16] This meant that the cattle-

[14] Annual Report, 1883, *op. cit.* p. 213.

[15] *Ibid.*, p. 214.

[16] In the summer of 1882 the Northern Pacific disposed of 750,000 acres to one company on the Little Missouri and Powder rivers at a dollar an acre. (Helena Weekly Herald, August 17, 1882.)

men were getting exclusive range at about fifty cents an acre. Since the roads were very easy on terms, the Union Pacific allowing payment over a term of ten years with six per cent interest, exclusive range cost a little better than five cents an acre a year and upon this basis many a cattleman thought he could operate.

But in spite of all these shifts, the northern cattleman came down to the latter years of the eighties with the open range to a large measure uncontrolled and unrestricted. Although the heart breaking winter of 1886–1887 brought disaster to the whole business, it was not an unmitigated evil. There were two beneficial effects: first, the range was cleared of those who had been operating on too narrow a basis and, second, those who did remain in the business were forced to be satisfied with small herds which would find future safety in privately owned pastures.

At this point it is possible to mark the beginning of new methods of plant and animal husbandry which form the basis for the present agricultural set up of the northern arid regions. Several groups are distinguishable which tend to merge one into another as the adjustment went forward. There were first a few remaining large cattle companies, some of which owned large blocks of land; second, a number of small cattle growers whose stock, usually in small bands and close herded, utilized part of the natural grazing resources; third, a group of irrigators, occupying favorable spots; fourth, the "granger" or frontier farmer on the fringe of agricultural settlement which had arrived in eastern Montana and Wyoming by the close of the range period; fifth, the older agricultural communities of the more fertile valleys, where the moisture was sufficient to carry on farming with a minimum of irrigation and sixth, the sheep owners, large and small. These various groups were the successors of the old range cattlemen of the eighties.

The winter of 1886–1887 had demonstrated to large and small cattlemen alike that the grass crop of the open ranges was far too uncertain a thing and that the stock-growing industry must look to the production of hay sufficient to carry the herd through the winter at least. We have noted the tendency in that direc-

tion before the catastrophe. Large companies had purchased wild hay lands, wherever available and had made some effort to provide feed for the weaker stock during the most severe weather. Had there been no disaster the drift toward land ownership in order to control a part of the grazing would have eventually forced the substitution of forage crops for the native grasses. The attendant costs of land ownership, taxes, interest and fencing would have brought about a condition where the raising of hay wherever possible would be a more economical utilization of the land than using it as natural pasture part of the time and grazing the open range for the remainder. When this point was reached, pasturing on the open range with its attendant dangers and costs of herding, would be discarded; first, the winter and then the summer pasturing.

The disaster merely hastened this process. The Douglas, Wyoming correspondent of the Northwestern Livestock Journal in March, 1887, noted the arrival in town of the manager of one of the large cattle companies on the Powder River with a shipment of twelve thousand pounds of grass seed, red top, timothy, alfalfa, clover and blue grass.[17] The change suggested by the appearance of such an item in a range journal was, of course, gradual but none the less fundamental. This reorganization on the new basis has been well described by the manager of one of the old companies that managed to hold on after 1887.

"It was evident," he wrote, "that the old system of the open range was passing and this was intensified by a series of dry years. Both grass and hay were short, but with good winters we managed to pull through. We rented our ranches. . . . paying so much per ton for hay for every one put in the stack and then we paid so much a month in winter time for feeding out the hay, cleaning out ditches, building fences, etc. We produced immensely more hay and eliminated waste. As we raised more hay and improved our pastures, we began weaning our calves, feeding our cows and heifers while away on the plains . . . . our steers took their chances. While it does not take long to tell of

[17] *Northwestern Live Stock Journal*, March 18, 1887.

these changes, it was a great task to reorganize the machinery of ranch work, cut down the cattle outfits, until in spring we had but one wagon running with the help of a second in the fall, and to look after the feeding of twelve to fifteen thousand head of cattle in pasture. Most neighbors moved out and left us. Sheep trespassers on our plains lands were hard to handle and we had a continual fight on our hands."[18]

The acreage devoted to the cultivation of hay in Wyoming and Montana increased more than tenfold during the period from 1880–1900 as the census figures for the three periods show.[19]

These figures not only mark the decline of the range cattle industry, but also the passing of that distinctive frontier figure, the cowboy. Mowing machines, hay rakes and ditching tools became a more important part of the equipment than the chuck wagon, the lariat and the branding iron.

"Cowboys don't have as soft a time as they did," lamented one member of the fraternity. "I remember when we sat around the fire the winter through and didn't do a lick of work except to chop a little wood to build a fire to keep warm by. Now we go on general round up, then the calf roundup, then comes haying —something that the old-time cowboy never dreamed of—then the beef roundup and the fall calf roundup and the gathering of bulls and weak cows and after all this a winter of feeding hay. I tell you times have changed. You didn't hear the sound of a mowing machine in this country ten years ago."[20]

Some of the larger operators turned to sheep raising. In Wyoming the rise of sheep population between 1890 and 1900 is very marked. Like the cattle growers, the sheepmen began to combine the summer pastures on the open range with the winter feeding of hay, raised on privately owned land or lands leased from the state. Senator F. E. Warren, who has been described

[18] John Clay, *My Life on the Range* (Chicago 1924), pp. 222–224. In 1888 this company put up 1200 tons of hay; in 1892, 3600 tons; in 1904, 14,600 tons.

[19] 1880 Montana, 56,801 acres mown; Wyoming, 24,328 acres mown
1890 Montana, 300,033 acres mown; Wyoming, 173,010 acres mown
1900 Montana, 712,048 acres mown; Wyoming, 377,148 acres mown

[20] Quoted from the *Barber County* (Kansas) *Index* in the *Breeders' Gazette*, VI, No. 17, p. 608, October 23, 1884.

as the greatest shepherd since Abraham, was reported in 1889 to own or control 284,000 acres.[21]

The development of irrigation was closely associated with this shift of the stock growing industry from the open range to a ranch basis. During the early period of settlement, the raising of grain crops, wheat, oats, etc. in Montana and Wyoming had been limited to the rich bottom lands where the fertility of the soil and the greater moisture close in to the mountains made production without irrigation possible. This type of farming was carried on in the Beaverhead, Madison, Deer Lodge and Gallatin valleys in Montana and along the upper reaches of the Wind River Valley in Wyoming. The next step in the extension of the farming area came in those spots where the contour of the land and the availability of water made irrigation comparatively easy. Miners, turned ranchmen, who had learned how to get water onto their mining claims by running ditches and flumes along the sides of the gulches began to put this knowledge to work in the narrow valley lands upon which some of them settled after the mining boom was over. Occasionally, a project which required more than the effort of a single rancher was attempted and a ditch company was formed.

By 1890, four types of holdings were distinguishable on the northern ranges. There was first the unirrigated farm which, until the appearance of the dry farmer, was limited to a few favorable localities in the mountain valleys; second, the unirrigated stock ranch, which still depended upon a combination of natural hay lands and the open range; third, the irrigated ranch, raising some crop other than forage; and fourth, the irrigated stock ranch where irrigation was carried on solely for stock raising purposes.

The first and second groups represent the older type of agriculture and stock raising. On the ranches of the third and fourth groups, irrigation was being employed either in the production of farm crops and forage or in the improvement of the natural pastures. In the third group, crop production under irrigation

[21] Advertisement of the Warren Live Stock Company in the "Statehood Edition" of the *Cheyenne Daily Sun*, March 28, 1889.

was being combined with stock raising; in the fourth, stock raising alone was being carried on with irrigation employed merely to increase the crop of grass found on the natural pasture. In both groups, however, stock raising and irrigation were combined and this alliance is of great importance in the process of adjustment following the range cattle days.

Even in the third group, where cereals were being raised under irrigation, the area devoted to these crops was very small compared with the acreage irrigated for forage crops or for the improvement of the natural pastures.

As for the fourth group, stock growers irrigating pasture lands, it is impossible from the available census figures to tell how many of those there were in the period following the range era or the area of land they occupied as the census does not give the figures of any group of irrigators, except those who were irrigating for other purposes than merely for increasing the grazing. They were irrigators as the term is commonly understood, but represented a transitional group who were moving over from the old range cattle group to the stock grower with forage crops raised by irrigation.

The irrigation systems of this transitional group were of the crudest and most temporary character, for they were designed merely to improve the natural grass crop in some favorably located spot. In the report in 1890 on Irrigation in the Western States, prepared for the Eleventh census, the investigator described this irrigating practice as follows:

"Many canals, especially along the larger rivers, receive water only in time of flood. . . . These so called high water canals are very cheaply built, the headworks, if any, being of a temporary character. Water is by this means turned out on the grazing lands, only one thorough watering during the year being secured."[22]

As time went on, the rising costs of land ownership forced these stock-growers to a more complete utilization of their land by the planting of forage crops instead of merely seeking to im-

[22] F. H. Newell, Irrigation in Wyoming, *Census Bulletin*, No. 107, August 27, 1891, p. 6.

prove the natural grasses. Thus, this group tended to disappear into the third group and irrigation systems assumed a more permanent character.

This alliance of irrigation with stock-growing can be traced in the increase in the average size of farms in the range country. Between 1880 and 1890, the average size of farms in Wyoming increased from 267 to 886 acres. This increase in the size of farms was accompanied by a corresponding increase in the number of farms as stock-growing moved over on a private ownership basis. The accompanying decrease in the improved but irrigated land shows how the new land holdings were of that marginal character where improvement must come through the development of irrigation. Forage crops continued to be predominant as the industry shifted to an irrigated forage crop basis. By 1900 the land held was chiefly irrigated or unimproved pasture, which looked at from the stock growing point of view meant haystacks for winter and enclosed pastures for summer grazing. Following 1900, the increase in the improved, non-irrigated land, first in Montana and then to a lesser degree, in Wyoming, marks the arrival on the deserted ranges of the dry land farmer. This new frontier figure in his struggle to conquer a part of the range which the cattleman abandoned in defeat is the hero—or victim—in another chapter in that long story of trial and error which constitutes the agricultural history of the semi-arid West.

THE RISE OF APPLIED ENTOMOLOGY IN THE UNITED STATES

By L. O. Howard*

At the tenth annual meeting of this Society, held September 13, 1927, my highly esteemed friend, Dr. B. T. Galloway, presented a review of the development of plant pathology in the United States; and his introductory paragraphs apply so well to insect damage that they might well be used for the present paper, simply substituting the words "agricultural entomology" for "plant pathology."

It is true that economic entomology is an older applied science, and hence it is true that for many years the entomologists looked upon the plant pathologists in the somewhat patronizing way that an elder brother looks upon a much younger one. In fact, as the years went by a certain amount of good-natured chaff was heard between the men of these different kinds of work. The

* Dr. L. O. Howard was born in Rockford, Illinois. He received a B.S. degree from Cornell University in 1877, a M.S. degree from the same institution in 1883, and a Ph.D. degree from Georgetown University in 1896. He served as assistant entomologist in the United States Department of Agriculture from 1878 to 1894 when he became chief of the Department's Bureau of Entomology. He has served as honorary curator of the department of insects of the U. S. National Museum since 1895 and consulting entomologist of the U. S. Public Health Service since 1904. He is a member of many scientific societies both at home and abroad. A fellow of the A.A.A.S., he served as its permanent secretary for twenty-two years and as its president in 1920. His eminence as a scientist has also been recognized by his being elected president of various learned societies, honorary member of many foreign scientific societies, and by his being made the recipient of the honorary degree of M.D. from George Washington University in 1911, an LL.D. from the University of Pittsburgh in 1911, Sc.D. from the University of Toronto in 1920 and LL.D. from the University of California, in 1928. Dr. Howard is the author of a number of important books and numerous government publications. In 1928 he retired from the chiefship of the Bureau of Entomology and is now devoting his time to writing and research for the Department. The paper here printed was read at the twelfth annual meeting of the Agricultural History Society, Washington, D. C., April, 29, 1929.

entomologist was apt to say, "There is nothing of a practical character in plant pathology except the recommended use of the Bordeaux mixture under all conditions." I recall that I made that remark once to Doctor Galloway and that he countered immediately by saying "There is, after all, nothing to economic entomology but the application of arsenicals for chewing insects and of dilute kerosene emulsion for sucking insects."

All that, however, is quite aside from my present purpose.

I have just returned from a long trip across the country. I have seen at Riverside and Berkeley, at Seattle and at Minneapolis, at Madison and at Urbana, large classes of earnest young men and women studying applied entomology; and at five of these places I have seen large corps of teachers, admirably equipped, all good research men, engaged in this teaching work. I have seen that the popular estimate of the entomologist has become very high. I have asked some of these teachers whether they felt, on account of their occupation, the faintest indications of an inferiority complex. All replied at once that they were proud of their work, that they were convinced of its great importance, and that they considered themselves among the most useful members of their respective faculties.

Moreover, I have seen, contrary to the old ideas, that the fear of insects is increasing; that people realize that they are causing increasing damage to humanity in an increasing number of ways.

Last Friday the U. S. House of Representatives, after a ten-minutes discussion, passed a joint resolution appropriating $4,250,000 to be expended in an effort to exterminate the Mediterranean fruit fly in Florida. This morning the Senate, *without discussion*, passed the same resolution. Two years ago the Congress appropriated the very great sum of ten millions of dollars to be spent in an effort to retard the westward march of the European corn-borer. Fifty-three years ago, after the Rocky Mountain locust, or western grasshopper, had devastated large portions of four of our western States, not only causing enormous financial loss, but bringing starvation and disease to very many people, a bill was introduced before Congress to appropriate $25,000 for a commission of entomologists to investigate locusts

and to try to find means to prevent future damage of the sort. The Congress, after long consideration, reduced the amount from $25,000 to $18,000, and a bill for the latter amount was passed.

Now what has caused the change between the conditions as I have described them as of the present and the condition that existed only a little more than fifty years ago? That is the story that I am trying to tell elsewhere in some detail, and I will brief its salient points tonight.

Let us assume that the territory now covered by the United States of America was in a condition of at least temporary stable equilibrium in regard to its animal and plant life at the period when settlement by the white race began. For a great many years the increase in the white population was slow. Agriculture was of small extent and spread out slowly into the forests and plains. There was very slow communication with other countries and none at all with any but those of Europe. There was practically no chance for the accidental importation of insect pests. The crops that were cultivated were in large part of sorts that were new to the country. Native insects at first did not damage them seriously, and down to the period of the War of the Revolution there were few complaints of insect damage.

After the Revolution, however, from time to time the scarce newspapers that paid attention to agriculture would record the unusual abundance of some pest; but on the whole no attention was paid to the subject that would warrant mention in a brief paper like this. The only great crop pests that had come to us from Europe prior to the Revolution were the codling moth and the Hessian fly.

Prior to 1800, the only writer on the subject we need mention here was William Dandridge Peck (1763–1822), who was Professor of Natural History in Harvard College and who wrote in 1795 about the canker worm. He followed, in the early years of the nineteenth century, with several papers on various injurious insects.

In 1841, Dr. Thaddeus William Harris, Librarian of Harvard College, published a report on "Insects Injurious to Vegetation in Massachusetts." It was a scholarly work, and it treated of many

plant-feeding forms. There was no mention of any critical danger, and the remedies suggested were little more than of the old Scotch gardener type.

A few years later (1853) Townend Glover received an appointment in the Bureau of Agriculture of the U. S. Patent Office. One of his numerous duties was "to collect information on insects."

The next year, Dr. Asa Fitch of New York was authorized by the New York State Legislature to examine insects, "especially those injurious to vegetation," and thus became practically the first State Entomologist. He published a series of reports from that time until 1872. They were full and careful reports, and in them he described the life histories of many important species, but brought out nothing striking in regard to methods of control.

Benjamin Dann Walsh, a trenchant writer on entomological subjects, was Acting State Entomologist of Illinois in the year 1867. He was a man of high culture, broad views and a prophetic mind. He was especially and harshly critical of many of the remedial measures then in vogue, and was particularly keen in his criticisms of the fake remedies that were then being foisted on the public and as a matter of fact are still being advertised from time to time. Referring to such so-called remedies, one of his phrases sticks in my mind: "Long live King Humbug! He still feeds fools on flap-doodle!" He published but one report, although he had previously been an associate editor of a journal, published in Philadelphia, called "The Practical Entomologist," and later was Associate Editor, with C. V. Riley, of "The American Entomologist," a journal devoted largely to practical matters in entomology.

In 1878 Glover was retired from the position of Entomologist to the United States Department of Agriculture, and Charles Valentine Riley was made his successor. Riley served until 1894, with the exception of the years 1879 and 1880, during which period John Henry Comstock (before and afterwards Professor of Entomology at Cornell University) held the position.

The work done by Riley and Comstock in the Department of Agriculture was of the highest type. Riley had previously served as State Entomologist of Missouri from 1869 until 1876

and had published nine reports, admirably illustrated and very sound, which did much to show the importance of careful work. These Missouri Reports are full of notable things and from the practical point of view one of the most striking is the effective work that he did in the investigation of the grapevine Phylloxera and in the subsequent selection of resistant vine stocks from the United States for shipment to Europe for grafting purposes. He thus played an important part in the saving of the wine industry.

During the two years that Comstock served at Washington he accomplished a number of important things. One of them was the preparation of a large volume on cotton insects, but still more important was his study of the scale insects. He worked out the classification and life histories of very many of the injurious scale insects of the United States, an accomplishment that proved to be of the greatest value, since in the rapidly ensuing years many scale insects proved to be extremely injurious.

During Riley's final term of office (1881–1894) progress was great. Many important investigations were begun. The entomological service was made a Division, and the funds for research were slowly increased by Congress. Aside from the rather elaborate annual reports, many bulletins and circulars as well as a few special reports were published. Seven volumes of an important illustrated periodical bulletin called "Insect Life" were also published and very widely circulated. The achievement of Riley's administration, however, that attracted the widest popular and scientific interest was the brilliantly successful introduction of the Coccinellid, *Vedalia* (*Novius*) *cardinalis* from Australia to destroy the cottony cushion scale in California. This scale was causing the citrus growers of that State the greatest alarm. The very existence of citrus culture in California was threatened. Some orchards actually went down under the axe. But in a very few months after the introduction of the little beetle all fears were gone. So rapid was the multiplication of the introduced insect and so great was its voracity, that the scale insect soon ceased to be feared. This was the first large demonstration of the possible value of the introduction from one country to another of the natural enemies of an introduced insect pest.

In 1876, as indicated in a previous paragraph, the federal Congress appropriated eighteen thousand dollars to be spent by a commission of three men to investigate the Rocky Mountain locust. This action was the first national legislation of any importance of this kind. It was largely brought about by hard and intelligent work on the part of Professor Riley. It is interesting to note that while the bill making this appropriation was under discussion in the House *The Nation,* considered at the time to be possibly the leading journal representing the best public opinion, published in its issue for March 16th the following satirical note:

> "The Republicans in the Senate, not to be beaten at investigations, have passed a bill to investigate insects injurious to vegetation—the locust, the chinch bug, the army worm, the Hessian fly and the potato bug. The bill provides for an investigator-in-chief at a salary of four thousand dollars a year, the Herculean labors of the head of the Agricultural Bureau preventing that official from giving the necessary time to it. The act, should it pass the House—which seems doubtful—will be a new application of the great principle of division of labor, for in future the Agricultural Commissioner will scatter the seed broadcast over the land, while the national entomologist will follow closely on his trail and exterminate the various bugs that may attack the ripening grain. We only want now another Commissioner to harvest the crops, and another to see that they get to deep water, and the husbandman will be entirely relieved from grinding toil."

It was ideas of that sort and public opinion of that kind that Riley and his colleagues had to combat in those days; and the progress made in the face of ignorance and apathy is extraordinary.

When Riley left Missouri his place as Entomologist of that State was not filled. Illinois appointed Dr. William LeBaron as successor to Walsh, and he in turn was succeeded by the Reverend Cyrus Thomas, who was followed by Dr. S. A. Forbes.

With the passage of the Hatch Act in 1888 and the starting of State Agricultural Experiment Stations, a very considerable impulse was given to work in entomology; and the creation of positions, enabled by this act, turned the attention of a number of good young men in this direction. It seemed for the first time that there might be a career in economic entomology. As a result also, the teaching of economic entomology received a great impetus. New departments of this kind were established in the agricultural colleges and state universities. The demand for

teachers at first was so great as to exceed the supply of trained men, and the early publications of the agricultural colleges and experiment stations were for the most part compilations from the writings of Fitch, Riley, Walsh, LeBaron, Thomas, Packard and A. J. Cook. A. S. Packard, Jr., by the way, had served for two years as State Entomologist of Massachusetts, and Professor A. J. Cook had been lecturing on insects for a number of years at the Michigan State Agricultural College.

Soon after the starting of the experiment stations under the Hatch Act, the Association of Economic Entomologists was formed, and this Association has come to be a very powerful factor in the development of applied entomology and in the correlation of the work of the many people engaged.

The closing decade of the last century, however, witnessed four striking events that focused the attention of very many people and of very many countries on the subject of insect damage. The gipsy moth and the brown-tail moth were found in Massachusetts; the cotton boll weevil crossed the Rio Grande from Mexico; the San Jose scale was found in the East, and insects were discovered to carry certain diseases of man and of domestic animals.

The great struggle against the gipsy moth, that has continued down to the present day, has had far-reaching results in several directions. It has hastened the discovery of effective insecticides; it has very largely improved high-power spraying machinery; it has resulted in a very large-scale and long-continued experiment looking toward natural control by the importation into the United States from Europe and Japan of the parasites and other natural enemies of the destructive species.

The advent of the cotton boll weevil has demonstrated in a startling way the possibilities of insect damage. Entering the United States in the vicinity of Brownsville, Texas, it spread year after year until in about twenty-five years it covered the whole cotton belt. It brought about immense money loss; it caused the financial failure of many planters and of many banks; it complicated the labor situation and caused suicides among planters, bankers and speculators. It called striking attention,

however, to the weakness of the one-crop system, and will prove in the long run to have been beneficial to the Southern States.

The advent of the San Jose scale in the East caused great alarm for a number of years. It was the cause of quarantines against American fruits by most of the countries of the world.

The discovery that insects may carry certain diseases to man and to domestic animals has proved of enormous benefit and has created a new branch of preventive medicine. Work following this discovery has eliminated yellow fever from the United States and from most other parts of the world and has greatly reduced mortality and suffering from malaria and from many tropical diseases. In fact, investigations of this kind have opened up the possible habitation of tropical countries by the white race and the bringing of such countries into the greatly needed food-producing assets of the world.

As time has gone on, since the beginning of the present century, we have seen, partly as the result of these striking events of the preceding ten years, a rapidly growing activity in the fight against insects. A very notable event was the passage of the law creating the Federal Horticultural Board administered by the Secretary of Agriculture. By the means of this act the country has been able measurably to protect itself against the importation of new pests from abroad, and the change of this Board into the present Plant Quarantine and Control Administration has placed the work of this branch of the public service upon a strong base and will result in a more efficient protection of the country.

In spite of the rapidly growing activity in the fight against insects, however, there has come strongly to our attention the fact that under present conditions, notwithstanding the increased number of workers, damage by insects is increasing rather than diminishing; and it has also become apparent that this increase is due almost entirely to our own methods in agriculture.

The population of the country is growing rapidly. Without counting immigration, we are now increasing at the rate of one million per year, and that rate itself is increasing. Every year we must feed very many more people than the year before. We must be growing more food constantly. Naturally, all these years we have adopted the quickest, the most economical and the

most convenient ways of growing these foods. There have been enormous plantings of single and of allied crops. Often there has been very little rotation. In our haste to feed our increasing millions, we have overlooked the fact that we are feeding increasing billions of insects. By our very methods we are giving certain species of insects the most unprecedented chance to multiply. This will force us in many cases to change our methods—to vary our growing and our cropping systems. We must realize this at once.

It is true that more than half our principal crop pests have been introduced accidentally in the course of commerce. With the passage of the Plant Quarantine Act in 1912, we placed a barrier against this danger; but that it still exists is evident from the Florida experience of the last few feeks. And this Mediterranean fruit-fly, the pink bollworm, the Japanese beetle and the Asiatic beetle, while still more or less local, will probably spread and will utilize to the full the fairly riotous living spread out on all sides. So that, after all, we not only welcome the hundreds of young men who are joining the ranks of the economic entomologists, but we beg for the assistance and cooperation of the farm organizations and the farm leaders and especially the agronomists and the agricultural engineers, and also of the chemists, the physicists and the plant physiologists. The trained entomologist can follow the life history of a given species. He can study it in all its aspects. He can work out its general ecology. He can find its weak point if it has any. He can find the reasons why it is increasing and spreading. Often he can point out how the greatest damage can be avoided by different farming methods. It is then the agronomist who must advise. The farm planners, the farm organizations, the farm leaders must then take hold.

This is shown very well I think in the case of the European corn borer. The great danger from this pest would be nonexistent if it were not for the corn-growing system in a large part of the corn belt. The entomologists have shown that for seven months in the year the borer is helpless at the base of the cornstalks. Is it not obviously the duty of some other than the entomologist to find out the most economical and easiest way of getting rid of the cornstalks at some time during that long rest of seven months?

NEWS NOTES AND COMMENTS

PERSONAL

Russell H. Anderson, whose work on the history of agriculture in Illinois was noted in AGRICULTURAL HISTORY for January, 1929, has been appointed head of the division of agriculture and forestry in the Rosenwald Industrial Museum in Chicago.

Lucile O'Connor, Herbert A. Kellar's research associate in the McCormick Agricultural Library, has been working in the Library of Congress, the General Land Office, and the Office of Indian Affairs gathering material on Solon Robinson.

Joseph C. Robert, a graduate of Duke University and a fellow at Harvard University during 1929–30, is doing research on the Tobacco Industry in the Virginia-Carolina Area since the Revolution. He has spent most of the summer doing research in the Library of Congress and the library of the United States Department of Agriculture.

O. C. Stine gave a talk on *The Farmers of '76* at the noon-day radio network program of the Department of Agriculture on July 4, 1929. It is available as a mimeographed publication from the Division of Economic Information, Bureau of Agricultural Economics, Washington, D. C.

BACK NUMBERS

The Agricultural History Society will appreciate hearing from anyone having a copy of the first number of the first volume of AGRICULTURE HISTORY which he is willing to give or sell to the Ohio State Archaeological and Historical Society, Columbus, Ohio, or the library of the Department of Agricultural Economics and Farm Management, State College of Agriculture, Ithaca, New York.

COMMENTS ON BOOKS AND ARTICLES

The Agricultural History Society has just received a reprint of the illustrated article by Waldemar Kaempffert entitled *Revealing the Technical Ascent of Man in the Rosenwald Industrial Museum* which appeared in the Scientific Monthly for June, 1929. New readers of AGRICULTURAL HISTORY are reminded that Mr. Kaempffert had an article on *The History of Agriculture and the Rosenwald Museum* in AGRICULTURAL HISTORY for October, 1928.

Wolfgang Kunkel's *Über die Veräusserung von Katoekenland* in Zeitschrift du Savigny-Stiftung für Rechtsgeschichte, Romanistische Abteilung for 1928 is based on ten late-Ptolemaic Greek papyri, three of which are republished at the end of the article.

In *Les Lois Agraires des Gracques et la Guerre Sociale* in the Bulletin de l'Association Guillaume Budé for January, 1929, Jérôme Carcopino considers the Social War as an epilogue to the agrarian legislation of the Gracchi, the result of the economic disorder following the unequal enforcement of the Gracchan laws in the territory of the allies rather than because of the refusal to grant citizenship to the allies as Mommsen contended.

The issue of Economic Geography for July, 1929, includes *Canada's Advance to Hudson Bay*, by Harold S. Patton of the University of Cincinnati; *Economic Conditions in St. Vincent, B. W. I.*, by G. Wright of Imperial College of Tropical Agriculture, Trinidad; *Economic Geography of the Hawaiian Islands*, by Otis W. Freeman; and the fifth installment of *Agricultural Regions of South America* by Clarence F. Jones of Clark University.

Chief among the articles in the Geographical Review for July, 1929, of interest to readers of Agricultural History is one by Miss Ellen Churchill Semple on *Ancient Mediterranean Pleasure Gardens*. The factors contributing to the development of the ancient gardens are considered and the gardens in Palestine and Syria, Egypt, Greece, Rome, and Arabic Spain are described and

commented upon. Fifteen illustrations are included. This article is part of Miss Semple's extensive study of ancient Mediterranean agriculture, two parts of which were printed in the issues of Agricultural History for April and July, 1928. The same issue of the Geographical Review contains an article on *Flood-water Farming* by Kirk Bryan of Harvard University, one on *New England* by John K. Wright giving information and maps from the American Geographical Society's New England Studies, and also a brief article, *An Isopleth Map of Land Under Crops in India* by Wellington D. Jones of the University of Chicago.

The April, 1929, number of the Bulletin of the Business Historical Society has an interesting study of Robert Morris entitled *Land Speculations of a Great Patriot.*

H. J. Cowan's *Selkirk's Work in Canada: an Early Chapter* in the Canadian Historical Review for December, 1928, is an account of Selkirk's brief interest in a tract of land in western New York acquired by him in 1800 for the purpose of colonization and land speculation.

Some Pennsylvania Pioneers in Agricultural Science, by Thomas I. Mairs, published by Pennsylvania State College in 1928 as Pennsylvania State College Studies in Agriculture, No. 1, College Series No. 2, gives the significant events in the lives of a few of the men who were most prominent in developing the foundation of the School of Agriculture and the Agricultural Experiment Station of the Pennsylvania State College. Henry Prentiss Armsby, William Armstrong Buckhout, George C. Butz, William Frear, John Hamilton, Whitman Howard Gordan, William Calvin Patterson, William Griffith Waring, Frederick Watts, Hugh Nelson McAllister, and Moses Thompson are the men considered.

An article on Jefferson as a farmer by Martin Severin Peterson and Marvin Paul Grim appears in Wallace's Farmer for July 26, 1929, under the title *The Farmer Who Founded Democracy.*

An article entitled *John C. Holmes Played Major Rôle in Founding College* in the Michigan State College Record for June, 1929, gives an account of the work of John C. Holmes in the founding of Michigan Agricultural College and during the first years of its existence.

A series of *Documents relating to El Destino and Chemonie Plantations, Middle Florida, 1828–1868*, edited, with an historical introduction by Professor Kathryn T. Abbey of the Florida State College for Women is being printed in the Florida Historical Society Quarterly. These plantations were located a short distance from Tallahassee.

The University of Minnesota Press has sent the Agricultural History Society a copy of Wayne E. Butterbaugh's forty-page study entitled *Minnesota Freight Rate Structure*. It is part of the Central Northwest Regional Survey commented on in the issue of AGRICULTURAL HISTORY for October, 1928.

The Journal of Land & Public Utility Economics for November, 1928, includes an article on *Trends in the Agriculture of the Hard Winter Wheat Belt* by W. E. Grimes.

The X I T Ranch of Texas and the Early Days of the Llano Estacado, by J. Evetts Haley, field secretary of the Panhandle-Plains Historical Society, has just been privately printed. The copyright is held by Capitol Reservation Lands, Chicago.

An article by C. C. Rister on *The Significance of the Destruction of the Buffalo in the Southwest* appears in the Southwestern Historical Quarterly for July, 1929.

The Purchase and Importation of Camels by the United States Government, 1855–1857, by Lewis B. Lesley of San Diego State College, San Diego, California, appears in the Southwestern Historical Quarterly for July, 1929. The same subject has been dealt with more comprehensively and with a wider range of

sources in a master's thesis by Leo F. Mahoney, University of Texas, 1927, on file in the library of the University of Texas.

Oscar Schmieder's *The Russian Colony of the Guadalupe Valley*, one of the University of California Publications in Geography (v. 2, 1928, no. 14, p. 409–434) is a study of the colony of Molokanye, Russian peasant sectarians closely resembling the Scotch Presbyterians in beliefs, established in Lower California a quarter of a century ago. There the Russian *mir* system has been preserved. The monograph gives much information on the changes which have taken place in the agriculture of the colony since it was established.

Paul S. Taylor's *Mexican Labor in the United States Imperial Valley*, published by the University of California Press in 1928 as University of California Publications in Economics, volume 6, no. 1, is an analytical exposition, both historical and contemporary, of an American community and a large resident Mexican laboring population.

The University of Montana Agricultural Experiment Station, Bozeman, Montana, has issued Bulletin no. 220, *An Economic Analysis of Production Problems in the Bitter Root Valley*, by Sherman E. Johnson. It contains a short account of the historical development of the region's agriculture.

An article on the *Use of Soil Products by Indians* by J. N. Barry is included in the Oregon Historical Quarterly for March, 1929.

The United Empire for April, 1929, includes a short account of the tobacco industry in Quebec under the title *Cigar Tobacco Growing in Quebec* by Colonel J. Bruce Payne.

The same number of the United Empire contains an article entitled *Farms for British Families* by E. H. Gamble which deals with the work of the Hudson's Bay Company in colonizing and settling Canada with British families.

Edward Corcoran's *My Experiences as a Farm Hand in Canada* in the United Empire for March, 1929, is a narrative of a Cambridge undergraduate's experiences as a harvester in Saskatchewan.

O. Lapalice's *La Dîme à Montreal* in the Bulletin des Recherches Historiques for February, 1929, considers the origin of the tithe on wheat and grains in the district of Montreal.

Miss N. Neilson's paper, *English Manorial Forms*, read before the meeting of the American Historical Association at Indianapolis last December, has been published in the American Historical Review for July, 1929.

The fourth volume of the series *Life and Work of the People of England* (Putnam, 1929), by Dorothy Hartley and Margaret M. Elliot, is devoted to the seventeenth century. Like the preceding volumes on the fourteenth, fifteenth, and sixteenth centuries, it is "a pictorial record from contemporary sources." Agriculture is one of the phases of life represented in the pictures.

L'importation en France, au XVIII^e siècle, du boeuf salé d'Irlande by Léon Vignols in Revue Historique for September–October, 1928, is a study of Ireland's virtual monopoly in the French market of salt beef during the 18th century, large quantities of which were sent to French ports for reshipment to the West Indies and Louisiana to feed slaves.

Hubert von Pechmann's study entitled *Die Forstrechte eines oberpfälzischen Forstamts, ihre Entwicklung und ihre Bedentung für die Volkswirtschaft* was published in the issue of the Fortswissenschaftliches Centralblatt for 1928.

Wolfgang Hirschberg's *Entwicklungen in der dänischen Landwirtschaft* in Europäische Revue for July, 1928, considers the subject since the reorganization of Danish agriculture after the crisis of the 1870's.

The Annals of the Association of American Geographers for March, 1929, includes an article by W. O. Blanchard on *The Status of Sericulture in Italy*.

An appreciation of Franz Karl Achard's pioneer work by Wilh Stieba under the title, *Franz Karl Achard und die Frühzeit der deutschen Zuckerindustrie*, in Schmoller's Jahrbuch for December, 1928, is based on material in the Prussian state archives.

A brief unsigned article called *A Century of Hop Growing in Poland* appears in the Polish Economist for December, 1928.

Kyösti Haataja's *Land Reform in Finland* appeared in the Bank of Finland Monthly Bulletin for 1928.